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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/028,860 | 12/19/2001 | Paul B. Koeneman | 42390.P12041 | 4678 |

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EXAMINER

ALI, MOHAMMAD M

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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3744

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/028,860

Applicant(s)

KOENEMAN ET AL.

Examiner

Mohammad M Ali

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9, 12-20 and 22-29 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 and 11 is/are allowed.
- 6) ☒ Claim(s) 1-9, 12-20 and 22-29 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-4, 6-9, 12-20 and 22- 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel (5,396,403) in view of Daikoku et al. (6,351,384). Patel discloses a integrated circuit chips/package comprising an integrated circuit die/thermally conductive plate 19 having an active surface, a cavity 57, substrate 11, solder bumps 17, heat sink 23, cable connection 59 and interposer/chips 13. Patel discloses the invention substantially as claimed as stated above. See Fig. 1 and 4. However, Patel does not disclose cooling fluid. Daikoku et al. teach the use of a cooling fluid 19 delivering the cooling fluid to an active surface 20 to contact the surface 20 and move laterally across the surface in a semi conductor multi chip module for the purpose of removing heat from the semiconductor device. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the

integrated circuit of Patel in view of Daikoku et al. such that a cooling fluid could be provided in order to remove heat from the semi conductor device.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel in view of Daikoku et al. as applied to claims 1-4 above and further in view of Lin et al. (6,188,578 B1). Patel in view of Daikoku et al. disclose the invention substantially as claimed as stated above. However, Patel in view of Daikoku et al. does not disclose an underfill material. Lin et al. teach the use of an underfill material 18 in an integrated circuit package for the purpose of serving an integrated circuit. See Fig. 1. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the integrated circuit chips of Patel in view of Newton et al. and further in view of Lin et al. such that an underfill material could be provided in order to serve the integrated circuit.

Response to Arguments

Applicant's arguments filed 02/20/2003 have been fully considered but they are not persuasive. The Applicant argued, " Claim 1 recites a cooling fluid in contact with the active surface (emphasis added). Claim 8 recites cooling fluid to contact and move laterally across the active region (emphasis added). Claim 12 recites moving a cooling fluid laterally across an active surface of the integrated circuit die (emphasis added). Claim 17 recites cooling fluid is to contact and move laterally across the active surface (emphasis added). Claim 27 recites cooling fluid ----- to contact and move laterally across the active region of the integrated circuit die (emphasis added). Patel in combination with Umezawa do not teach or suggest the cited portion of claims 1, 8, 12, 17 and 27 and amended claim 8 and 17." Claim 27 recites in contact with the active region of the integrated circuit die (emphasis added). The Examiner disagrees. Patel did

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not disclose a cooling fluid but Examiner opined that the cavity 57 is filled with a cooling fluid. The cavity is not vacuumed and hence it must be filled at least with air, which is invariably a cooling fluid. The Applicant did not put any remark on it. However, for more clear perception The Examiner has further given 103 rejections in combination with Patel and Daikoku et al.. Newman teaches the cooling feature of active surface or active region . Though Newton et al. do not disclose active region, it is implied that where there is an active surface there is an active region. Therefore, the rejections as done above are proper.

The Examiner believes that these rejections with necessary motivations and justifications will meet The Applicant's requirements.

Any inquiry concerning this communication or earlier from the examiner should be directed to Mohammad M. Ali, whose telephone number is (703) 308-5032. The examiner can be reached from 6:10am to 2:40pm from Monday to Friday.

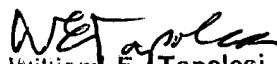
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Denise Esquivel, can be reached at (703) 308-2597. The fax number for the organization where this application or proceeding is assigned is 703-308-7764 for regular communications and after-final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0861.

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October 20, 2003


William E. Tapolcai
Primary Examiner
Art Unit 344